hypertrophic cardiomyopathy: A 3D speckle tracking imaging study

D. Voiliot, A. Hutton, T. Vaugrenard, C. Selton-Suty
a ILCV, CHU de Brabois, Nancy, France
b CHU de Marseille, Marseille, France

Objectives. To assess LV myocardial deformation with 3D echocardiography in HCM and study the impact of hypertrophy on global and regional systolic deformation.

Patients and methods. A complete rest echocardiography (GE Vivid 9) was performed in 41 HCM and in 114 control patients. Secondary HCM were assessed. LV systolic deformation was assessed by 3D strains. Values of 3D global LV longitudinal (3DGLS), circumferential (3DGCS), radial (3DRS) and area strain (3DGAS) were obtained from all patients. We classified segments depending on their thickness as first quartile (≤105 mm, n=157), second quartile (105–131 mm, n=152), third quartile (131–166 mm, n=162) and fourth quartile (≥166 mm, n=165).

Results. All strain values were significantly higher in control than in HCM pts. There was a significant decrease from second quartile to fourth quartile (P<0.05), gradually for longitudinal then radial and circumferential strain values (Table 1).

Conclusion. 3D echocardiography is a useful tool in HCM patients, bringing in one acquisition all global and regional deformations parameters. Hypertrophy has an impact on the global mechanics of LV and on regional kinetics of hypertrophic segment impairing gradually longitudinal then circumferential and radial deformation. However, there is also an impact on mechanics of non-hypertrophic segments suggesting an overall involvement of the myocardium.

Table 1 3D strain values.

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>&lt;105 mm</th>
<th>105–131 mm</th>
<th>131–166 mm</th>
<th>&gt;166 mm</th>
<th>HCM patients</th>
<th>Controls</th>
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<tbody>
<tr>
<td>&lt;105 mm</td>
<td>n=157</td>
<td>n=152</td>
<td>n=162</td>
<td>n=165</td>
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<tr>
<td>LVF (%)</td>
<td>56.6±1.1 13.3</td>
<td>54.9±12.0</td>
<td>62.3±7.1</td>
<td>62.6±4.4</td>
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<td>3DGAS (%)</td>
<td>25.0±0.10d</td>
<td>25.0±0.10d</td>
<td>25.0±0.10d</td>
<td>34.8±3.2</td>
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<td>3DGCS (%)</td>
<td>14.6±6.8</td>
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<td>3DGGLS (%)</td>
<td>25.0±6.2</td>
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<td>3DGLS (%)</td>
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<td>3DRS (%)</td>
<td>17.7±3.2</td>
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<td>3DGAS (%)</td>
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<td>25.0±6.2</td>
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a P<0.05, 105—131 segments vs. 131—166 mm segments.
b P<0.05, 131—166 mm segments vs. >166 mm segments.
c P<0.05, 105—131 segments vs. >166 mm segments.
d P<0.05, HCM patients vs. controls subjects.

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30 Diagnóstico de valor de la técnica de ecocardiografía en tres dimensiones contrast-echo en pacientes con bajo acústico: un análisis MRI comparación

E. Saloux, F. Labombarda, B. Anthune, A. Pellissier, M. Manrique
CHU de Caen, Caen, France

Objectives. Three-dimensional echocardiography (3DE) led to significant improvement in the accuracy and reproducibility of left ventricular volumes (LVV) and ejection fraction (EF) measurements but remains sensitive to patient echogenicity. The aim of this study was to evaluate the impact of temporal resolution, spatial resolution and image dynamic range on the ability of 3-dimensional contrast-enhanced echocardiography (C3DE) to assess LV function compared to CMR.

Patients and methods. We investigated 54 consecutive patients referred to our institution who underwent LV function assessment using both contrast echocardiography and cardiac magnetic resonance imaging CMR. All patients underwent two-dimensional echocardiography (2DE), non-contrast 3-dimensional echocardiography (NC3DE) and contrast-enhanced (C3DE) and CMR. LVV and EF were calculated for all modalities.

Results. Left ventricular end-diastolic volume (EDV) was underestimated by 2DE (141.8±53.8 mL), 3DE (145.6±68.6 mL), and to a lesser extent by C3DE (172.3±72 mL) compared to CMR (216.1±85.0 mL, all P values<0.001). Results were similar for calculation of LVEF. C3DE provided the best agreement with CMR with a greater Lin’s concordance correlation coefficient of 0.67, 0.93 and 0.99 respectively for EDV, ESV and LVEF and less drift of the bias for LVV and EF (lowest r² coefficient values between the difference and the average of the measurement, respectively r²=0.14, 0.18 and 0.01 for EDV, ESV and EF) as well as the best measurement reproducibility. Finally, ultrasound settings (spatial and temporal resolution, dynamic range) had no significant effect on volumes and ejection fraction measurements according to MRI.

Conclusion. C3DE overcomes 2DE and NC3DE and is a powerful alternative to CMR in patients with poor ultrasound image quality. Furthermore, this study showed that the choice of ultrasound settings, despite a sharp deterioration in spatial and temporal resolution, did not alter the accuracy of LV function assessment.

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31 Is there a cardiac involvement in patients with hemoglobin sickle cell disease?

N. Hamroudi, M. Duprey, M. Djebar, M. Charbonnier, K. Stojanovic, C. Girot, L. Michel, R. Insard, F. Lionnet
a Hôpital de la Pitié-Salpêtrière, Paris, France
b Hôpital Saint-Antoine, Paris, France
c Hôpital Tenon, Paris, France

Background. Adult’s patients with homozygous sickle cell disease have usually a dramatic left ventricular enlargement and a cardiac high output. Pulmonary hypertension is frequent in this population. Hemoglobin sickle cell disease is currently considered to be a mild variant of homozygous sickle cell disease with less severe anemia. At date no study have been dedicated to describe cardiac involvement of this disease.

Objective. To investigate cardiac involvement in adults patients with hemoglobin sickle cell disease (SC).

Methods. Using a case-control design, 64 adults with SC in stable condition (mean age 33.1±10.9 years, 34 women) and 64 age and sex-matched healthy subjects were studied. All patients underwent a complete echocardiography including measurement of the following parameters: Left ventricular ejection fraction (LVEF) and left ventricular end-diastolic volume index (LVEDI) by biplane method, cardiac index (CI), mitral E to Ea lateral ratio (E/Ea) and tricuspid regurgitation peak velocity (TRV). The exams were reviewed; each parameter was the average of 3 measurements.

Results. The observed values of LVEDI, LVEF and E/Ea in patients were significantly different than the corresponding values observed in the control group. However, no patient had LVEF<50% and no patient had E/Ea ratio>15. CI and TRV were similar in the two groups (Table 1).

Conclusion. Contrary to the patients with homozygous sickle cell disease, patients with hemoglobin sickle cell disease have only a mild left ventricular remodelling. In these patients, pulmonary pressure appears to be normal.
RV function parameters between rest and exercise. At exercise, cise echocardiography, there was no significant variation in any of index during exercise but PVR remained unchanged. During exercise right heart catheterization showed an increase in P AP and cardiac and inferolat strain progressively decreased. In patients with PHT, increased during exercise in normal patients, but lateral, inferior

Results

RV fractional area change (RVFAC), Tissue Doppler measured during echocardiography: RV fractional area change (RVFAC), Tissue Doppler

Methods

Background

J.-M. Sellal, Y. Juilliere, F. Chabot, A. Chaouat, C. Selton-Suty


CHU de Nancy, Nancy, France

Hôpital Bicêtre, Le Kremlin Bicêtre, France

Hôpital Lariboisière, Paris, France

Patients and methods.— Patients hospitalized for ADSHF were screened. Shock, sustained arrhythmias and reversible HF were excluded. All patients were treated by IV loop diuretics; none received IV vasodilators or inotropes. ACE-I, ARB and beta-blockers were maintained using previous dose or half-dose. Echocardiography and radial artery tonometry (Sphygmocor, AtCor) were simultaneously performed on admission and were repeated after clinical stabilization (day 4±1). Ejection fraction (EF, Simpson rule), end-systolic volume (ESV), stroke volume (SV) and cardiac output (CO) were measured using echocardiography. From the reconstructed central aortic pressure, end-systolic pressure (Pes) and aortic pulse pressure (PP) were recorded. The SV/PP ratio quantified total arterial compliance and Pes/SV quantified the arterial elastance (Ea). End-systolic left ventricular elastance (Ees) was calculated using the single-beat method.

Conclusion.— Analysis of RV function during exercise echocardiography is feasible in patients with PHT. Strain values during exercise mirror the changes of PVR, which decrease in normal patients and remain unchanged in patients with PHT, confirming their load dependency. In normal patients, the decrease in longitudinal strain coupled with the increase of other RV function parameters may suggest that longitudinal contraction of RV is not the prominent factor of RV response to exercise. In patients with PHT, the lack of decrease in longitudinal strain probably witnesses a kind of RV contractile reserve that counterbalances the increased afterload during exercise (as shown by elevated PAP and stable RVP).

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33 Early changes in ventricular-arterial coupling in acutely decompensated systolic heart failure (ADSHF): An echocardiography and arterial tonometry study


32 Assessment of right ventricular function at rest and during exercise by echocardiography in patients with pulmonary hypertension


Patients (n = 64) Controls (n = 64) P

Age (years) 33.1 ± 10.9 35.0 ± 12.3 0.34

Women, n (%) 34 (53) 32 (50) 0.72

Body surface (m²) 1.7 ± 0.1 1.7 ± 0.1 0.73

Left ventricular end diastolic index (ml/m²) 64.7 ± 15.2 53.3 ± 10.9 < 0.0001

Left ventricular ejection fraction (%) 60.2 ± 5.0 62.6 ± 4.4 0.005

Cardiac index (l/min/m²) 3.0 ± 0.5 2.8 ± 0.5 0.07

Mitral E to Ea ratio 5.2 ± 1.3 61 (95) 4.7 ± 1.3 61 (95) 0.03

Mitral E to Ea ratio ≤ 8, n (%) 3 (5) 3 (5)

Mitral E to Ea ratio > 15, n (%) 0 0

Tricuspid regurgitation peak velocity (m/s) 2.3 ± 0.2 2.2 ± 0.2 0.33

Tricuspid regurgitation peak velocity > 2.5 m/s, n (%) 5 (8) 6 (10) 0.79

Table 1

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Conclusion.— In ADSHF, early treatment mediated-hemodynamic changes are mainly characterized by a strong decrease in LV afterload, subsequent increase in LV ejection parameters and thus improvement in the ventricular-arterial coupling. In contrast, LV stroke work and contractility are poorly affected. Such an analysis is

Objectives.— Left ventricular (LV) performance is influenced by the coupled arterial and LV properties. Such properties have been poorly investigated during the real setting of acute HF. Our aim is to study the early change in ventricular-arterial coupling in patients with acutely decompensated systolic heart failure (ADSHF).

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